CLMPTO 08/12/05

VS

CLAIMS 1-14 (CANCELED)

15. A method of manufacturing a semiconductor device comprising the steps of:

forming a nitride film at a predetermined region on a main surface of a first semiconductor layer located on an insulating layer;

forming a side wall insulating film in contact with a side surface of said nitride film;

etching said first semiconductor layer to pattern said first semiconductor layer using said nitride film and said side wall insulating film as a mask;

forming a second semiconductor layer covering at least said insulating layer, said first semiconductor layer and said nitride film; and

oxidizing said second semiconductor layer to form an oxide film.

16. The method of manufacturing the semiconductor device according to claim 15, further comprising the steps of:

etching and removing said oxide film; and

effecting etching on the surface of said insulating layer simultaneously with the etching of said oxide film to form a U-shaped concavity at the surface of said insulating layer.

17. A method of manufacturing a semiconductor device comprising the steps of:

forming a nitride film at a predetermined region on a main surface of a semiconductor layer located on an insulating layer;

forming a side wall insulating film in contact with a side surface of said nitride film;

effecting etching on said semiconductor layer to remove a predetermined thickness using said nitride film and said side wall insulating film as a mask; and

selectively oxidizing said semiconductor layer to form an oxide film using said nitride film as a mask.

18. The method of manufacturing the semiconductor device according to claim 17, further comprising the step of:

effecting anisotropic etching on said oxide film to form a side wall oxide film in contact with the side surface of isa semiconductor layer.

19. A method of manufacturing a semiconductor device comprising the steps of:

forming a nitride film at a predetermined region on a main surface of a semiconductor layerlocated on an insulating layer;

selectively oxidizing said semiconductor layer to form an oxide film using said nitride film as a mask;

etching and removing at least a region of said nitride film near its side surface; and

effecting anisotropic etching on said oxide film and said semiconductor layer using said etched nitride film as a mask.

20. A method of manufacturing a semiconductor device comprising the steps of:

forming a nitride film at a predetermined region on a main surface of a first semiconductor layer located on an insulating layer;

effecting isotropic etching on said first semiconductor layer using said nitride film as a mask for removing a portion of said first semiconductor layer not located under said nitride film and a portion of said first semiconductor layer located under a side surface of said nitride film;

forming a second semiconductor layer covering said nitride film, said first semiconductor layer and said insulating layer by a sputtering method; and

oxidizing said second semiconductor layer.

21. A method of manufacturing a semiconductor device comprising the steps of:

forming a resist film at a predetermined region on a main surface of a first semiconductor layer located on an insulating layer;

effecting etching on said first semiconductor layer to pattern said first semiconductor layer using said resist film as a mask;

ion-implanting impurity into a side surface of said first semiconductor layer using said resist film as a mask;

forming a second semiconductor layer covering said first semiconductor layer and said insulating layer by a sputtering method after removing said resist film; and

oxidizing said second semiconductor layer.

22. A method of manufacturing a semiconductor device comprising the steps of:

forming a nitride film at a predetermined region on a main surface of a first semiconductor layer located on an insulating layer;

forming a side wall oxide film in contact with a side surface of said nitride film;

etching said first semiconductor layer pattern said first semiconductor layer using said nitride film and said side wall oxide film as a mask;

removing said side wall oxide film;

implanting inactive ions into said first semiconductor layer using said nitride film as a mask, and subsequently performing heat treatment;

oxidizing said first semiconductor layer to form an oxide film using said nitride film as a mask; and

implanting impurity ions into the side surface of said first semiconductor layer through said oxide film.

23. The method of manufacturing the semiconductor device according to claim 22, wherein

said inactive ions are silicon ions.

24. The method of manufacturing the semiconductor device according to claim 22, further comprising the steps of:

forming a second semiconductor layer covering said nitride film and said first semiconductor layer prior to said heat treatment, wherein

said step of oxidizing said first semiconductor layer includes the step of oxidizing said second semiconductor layer and a portion near the side surface of said first semiconductor layer.

25. The method of manufacturing the semiconductor device according to claim 24, further comprising the step of:

effecting anisotopic etching on said oxide film to form a side wall oxide film in contact with the side surface of said first semiconductor layer.

26. A method of manufacturing a semiconductor device comprising the steps of:

forming a nitride film on a main surface of a first semiconductor layer located at a predetermined region on an insulating layer;

forming a resist film at a predetermined region on a main surface of said nitride film;

implanting inactive ions and impurity ions into a portion near a side surface of said first semiconductor layer using said resist film as a mask;

forming a second semiconductor layer covering said nitride film, said first semiconductor layer and said insulating layer; and

oxidizing said second semiconductor layer and a region near the side surface of said first semiconductor layer.

27. A method of manufacturing a semiconductor device comprising the steps of:

forming a nitride film at a predetermined region on a main surface of a semiconductor layer located on an insulating layer;

selectively oxidizing said semiconductor layer over a predetermined thickness to form a first oxide film using said nitride film as a mask;

removing said first oxide film;

oxidizing said semiconductor layer a remaining thickness to form a second oxide film using said nitride film as a mask.

28. A method of manufacturing a semiconductor device comprising the steps of:

forming a nitride film at a predetermined region on a main surface of a semiconductor layer located on an insulating layer;

etching said semiconductor layer to pattern said semiconductor layer using said nitride film as a mask;

oxidizing a side portion of said semiconductor layer using said nitride film as a mask;

removing at least a portion of the nitride film located near the side surface of said semiconductor layer; and

implanting impurity ions into a portion near the side surface of said semiconductor layer using said nitride film as a mask.

29. A method of manufacturing a semiconductor device comprising the steps of:

forming a nitride film at a predetermined region on a main surface of a semiconductor layer located on an insulating layer;

selectively oxidizing said semiconductor layer to form a first oxide film using said nitride film as a mask;

removing said first oxide film by etching; and

oxidizing a side portion of said semiconductor layer to form a second oxide film using said nitride film as a mask.

30. A method of manufacturing a semiconductor device comprising the steps of:

forming a nitride film at a predetermined region on a main surface of a semiconductor layer located on an insulating layer;

selectively oxidizing said semiconductor layer over a predetermined thickness to form a first oxide film using said nitride film as a mask;

etching and removing said first oxide film using said nitride film as a mask;

forming a side wall nitride film in contact with a side surface of said nitride film;

anisotropically etching and removing a predetermined portion of said semiconductor layer using said side wall nitride film as a mask; and

oxidizing a side surface of said semiconductor layer to form a second oxide film.

31. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor layer having a main surface on an insulating layer, and then forming an oxide film on the main surface of said semiconductor layer;

forming a nitride filmon said oxide film;

forming on said oxide film a side wall nitride film in contact with a side surface of said nitride film;

etching said semiconductor layer into an isolated form using said nitride film and said side wall nitride film as a mask;

oxidizing a side surface of said semiconductor layer to form a side wall oxide film using said nitride film and said side wall nitride film as a mask; and

removing said nitride film and said side wall nitride film with thermo-phosphoric acid.

32. A method of manufacturing a semiconductor device comprising the steps of:

forming a second semiconductor layer on a main surface of a first semiconductor layer located located on an insulating layer;

forming a nitride film at a predetermined region on a main surface of said second semiconductor layer;

selectively oxidizing said second semiconductor layer to give a trapezoidal section to said second semiconductor layer using said nitride film as a mask; and

anisotropically etching said second and first semiconductor layers to remove said second semiconductor layer and give a trapezoidal section to said first semiconductor layer.

33. A method of manufacturing a semiconductor device comprising the steps of:

forming a plurality of isolated semiconductor layers on an insulating layer with a predetermined space between each other;

forming a nitride film to cover an upper surface of said insulating layer located at an isolation region between said adjacent semiconductor layers as well as a side surface of said semiconductor layer; and

oxidizing an upper side portion of said semiconductor layer using said nitride film as a mask.

34. A method of manufacturing a semiconductor device comprising the steps of:

forming a plurality of isolated semiconductor layers on a main surface of an insulating layer with a predetermined space between each other;

forming a concavities at a region of said insulating layer located between said isolated semiconductor layers and near a lower side portion of said semiconductor layer;

forming a side wall insulating film being in contact with the side surface of said semiconductor layer and filling said concavity at said lower side portion of said semiconductor layer; and

forming a polycrystalline silicon layer filling said concavity between said adjacent semiconductor layers.

35. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor layer on a first insulating layer;

forming a second insulating layer at a region on a main surface of said semiconductor layer corresponding to an isolation region;

forming an epitaxial growth layer having a trapezoidal section by epitaxial growth from an exposed surface of said semiconductor layer using said second insulating layer as a mask; and

effecting anisotropic etching on said epitaxial growth layer and said semiconductor layer to form a plurality of isolated semiconductor layers each having a trapezoidal section after removing said second insulating layer.

36. The method of manufacturing the semiconductor device according to claim 35, further comprising the step of:

oxidizing a surface of said epitaxial growth layer prior to the etching of said epitaxial growth layer and said semiconductor layer.

37. The method of manufacturing the semiconductor device according to claim 35, further comprising the step of:

implanting impurity into a region of said semiconductor layer under said second insulating layer and subsequently diffusing said impurity in a lateral direction, prior to said epitaxial growth.

38. The method of manufacturing the semiconductor device according to claim 35, further comprising the step of:

ion-implanting impurity into a region of said semiconductor layer forming an end of an active region through said second insulating layer by an oblique rotary implantation method, prior to said epitaxial growth.

39. The method of manufacturing the semiconductor device according to claim 35, further comprising the step of:

ion-implanting impurity of the same conductivity type as a channel region into a portion of said semiconductor layer located at an active region , prior to said epitaxial growth.

40. The method of manufacturing the semiconductor device according to claim 35, further comprising the step of:

performing mechanical-chemical polishing on an end of an upper surface of said epitaxial growth layer to round the end of the upper surface of said epitaxial growth layer, prior to the etching of said epitaxial gwoth layer and said semiconductor layer.

41. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor layer at a predetermined region on a main surface of an insulating layer;

isotropically etching said insulating layer, using said semiconductor layer as a mask, to remove a portion of said insulating layer in contact with a lower surface of said semiconductor layer by a predetermined amount; and

oxidizing said semiconductor layer to form an oxide film at least between said lower surface of said semiconductor layer and said insulating layer.

42. A method of manufacturing a semiconductor device comprising the steps of:

forming a nitride film at a predetermined region on a main surface of a semiconductor layer located at a predetermined region on an insulating layer;

selectively oxidizing said semiconductor layer to form an element isolating oxide film using said nitride film as a mask; and

ion-implanting impurity into a side end of said semiconductor layer through said element isolating oxide film using said nitride film as a mask.

43. A method of manufacturing a semiconductor device comprising the steps of:

forming a nitride film at a predetermined region on a main surface of a semiconductor layer located on an insulating layer;

etching said semiconductor layer to pattern said semiconductor layer into a plurality of isolated forms using said nitride film as a mask;

oxidizing a side surface of said semiconductor layer to form a side wall oxide film using said nitride film as a mask; and

ion-implanting impurity into a portion near a side surface of said semiconductor layer through said side wall oxide film using said nitride film as a mask.

44. The method of manufacturing the semiconductor device according to claim 43, wherein

said step of forming said nitride film includes the steps of:

forming a first nitride film on the main surface of said semiconductor layer; and

forming a section nitride film of a side wall form in contact with a side surface of said first nitride film.

45. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor layer on an insulating layer;

patterning said semiconductor layer and said insulating layer into a predetermined form;

forming a nitride film in contact with a side surface of said insulating layer and a lower portion of a side surface of said semiconductor layer; and

oxidizing the side surface of said semiconductor layer using said nitride film as a mask.

46. The method of manufacturing the semiconductor device according to claim 45, wherein

said step of patterning said semiconductor layer and said insulating layer includes the step of patterning said semiconductor layer and said insulating layer to form a first insulating layer and a first semiconductor layer located on said first insulating layer as well as a second insulating layer spaced from said first insulating layer by a predetermined distance and a second semiconductor layer located on said second insulating layer;

said step of forming said nitride film includes the step of forming a first nitride film being in contact with a side surface of said first insulating layer and a lower portion of a side surface of said first semiconductor layer as well as a second nitride film being in contact with a side surface of said second insulating layer and a lower portion of a side surface of said second semiconductor layer; and

forming an oxide film filling a space between said first and second nitride films.

47. The method of manufacturing the semiconductor device according to claim 45, wherein

said step of oxidizing the side surface of said semiconductor layer is performed in a wet atmosphere under the temperature condition not lower than 1100°C.

48. The method of manufacturing the semiconductor device according to claim 45, further comprising the step of:

performing mechanical-chemical polishing on an upper portion of the side surface of said semiconductor layer to round said upper portion of the side surface, prior to oxidation of the side surface of said semiconductor layer.

49. A method of manufacturing a semiconductor device comprising the steps of:

forming successively a semiconductor layer, a first nitride film and an etching stopper layer on an insulating layer;

etching said etching stopper layer, said first nitride film, said semiconductor layer and said insulating layer to give predetermined forms to the same;

forming a second nitride film covering said etching stopper layer, said first nitride film, said semiconductor layer and said insulating layer; and

etching said second nitride film to leave a portion of said second nitride film being in contact with a side surface of said insulating layer and a lower portion of a side surface of said semiconductor layer.

50. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor layer on an insulating layer;

patterning said insulating layer and said semiconductor layer to form a first insulating layer and a first semiconductor layer located thereon as well as a second insulating layer spaced from said first insulating layer by a predetermined distance and a second semiconductor layer located thereon;

forming a nitride film to fill a space between, on one hand, said first insulating layer and said first semiconductor layer and, on the other hand, said second insulating layer and said second semiconductor layer; and

etching back said nitride film to leave a portion of said nitride film being in contact with side surfaces of said first and second insulating layers and lower portions of side surfaces of said first and second semiconductor layers.